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Short Communication

Prevalence and Factors Associated with Rheumatic Disorders Among Shahrekord Cohort Study Population: The Use of a Screening Program

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Abstract
This study aimed to investigate the prevalence and factors associated with arthritis rheumatoid using a screening program among Shahrekord cohort study population. The present analytical cross-sectional study was performed on 1043 participants of the PERSIAN cohort study in Shahrekord, Iran. The prevalence of rheumatic disorder (RD) was 57.5% (95% CI: 53-62 %). Females were more likely to develop RD than males (odds ratio [OR] = 2.83, $P < 0.001$). Additionally, with increasing age (OR = 1.03, $P < 0.001$) and body mass index (OR = 1.03, $P < 0.001$), the chance of developing RD increased. Moreover, the chance of developing RD in males with industrial jobs was higher than in males with non-industrial jobs (OR = 1.53, $P = 0.07$). The prevalence of RD in this study was high. The female gender, old age, and obesity were among the factors related to RD in this study. As a result, public education is necessary to modify the behavioral pattern and lifestyle.
Keywords: Rheumatological disorders, Rheumatoid arthritis, COPCORD questionnaire, Screening, Cohort

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Introduction

Rheumatic disorders (RDs), due to their heterogeneous clinical manifestations, have a different distribution range in different societies.[1] Although RDs are considered a major threat to public health worldwide, due to the increasing expansion, they are of special importance in developing countries.[2] The prevalence and severity of RD vary greatly depending on the ethnic, social, genetic, geographical, cultural, and economic conditions of different regions.[3] Chaharmahal and Bakhtiari (Ch & B) province is one of the mountainous regions of the Iranian Central Plateau and is located between 31° 9′ to 32° 38′ north latitudes and 49° 30′ to 51° 26′ east longitude GMT. The province is known as "the roof of Iran" because its average altitude is around 2153 m above sea level. Ch & B province is one of the coldest provinces in Iran considering that the temperature in the cold season in some areas reaches -20 °C. Moreover, more than 55% of the inhabitants of this region are of Lor (Bakhtiari) ethnicity.[4]

This study aimed to determine the prevalence and factors associated with RD using a screening program among the study population of the PERSIAN cohort study in Shahrekord, Iran.

Materials and Methods

Study Design

This study was performed on the study population of a prospective cohort study on health status and noncommunicable diseases in Chaharmahal and Bakhtiari province [Shahrekord Cohort Study (SCS)] using the data collected from 2017 to 2020.

Selection and Description of Participants

The SCS is a population-based study including 10075 people. In this cross-sectional-analytical study, a sample size of 1043 people was randomly selected from the cohort.

Inclusion Criteria

- Age group of 35-70 years
- Informed consent to participate in the study

Exclusion Criteria

- History of severe psychiatric disorders
- History of trauma or accident (traffic and non-traffic)
- History of amputation due to other diseases or complications of other diseases

Data Gathering Tools

The instrument used in this study was the RD Questionnaire (COPCORD). The questionnaire consisted of 6 sections including background information, job history, pain, tenderness, swelling, and stiffness (during the last 7 days),

Table 1. Demographic Characteristics of the People Included in the Study

Variable		RD, No. (%)		Total, No. (%)	*P* Value
		NO	Yes		
Gender	Male	290 (56.20)	226 (43.8)	516 (49.5)	0.0001
	Female	153 (29)	374 (71)	527 (50.5)	
Age	35-50	263(47.7)	288 (52.3)	551 (52.9)	0.001
	50-60	109(35.9)	195(64.1)	304 (29.1)	
	60-70	71(37.8)	117 (62.2)	188 (18)	
Residence	Urban	359 (40.6)	525 (59.4)	884 (84.8)	0.004
	Rural	84 (52.8)	75 (47.2)	159 (15.2)	
Ethnicity	Fars	212 (42.2)	290 (57.8)	502 (48.1)	0.93
	Lor	181 (43.1)	239 (56.9)	420 (40.3)	
	Others	50 (41.3)	71(58.7)	121 (11.3)	
Marital status	Single	6 (50)	6 (50)	12 (1.1)	0.31
	Married	427 (42.8)	571 (57.2)	998 (95.7)	
	Divorced/Widowed	10 (30.3)	23 (69.7)	33 (3.2)	
Education	Illiterate	105 (36.1)	186 (63.9)	291 (27.9)	0.03
	Primary	51 (37)	87 (63)	138 (13.2)	
	Tips	40 (45.5)	48 (54.5)	88 (8.4)	
	Diploma	88 (47.8)	96 (52.2)	184 (17.6)	
	Associate degree	42 (51.21)	40 (48.8)	82 (7.9)	
	Bachelor's degree and higher	117 (45)	143 (55)	260(24.9)	
Job	Worker	63 (47.4)	70 (52.6)	133 (12.8)	0.0001
	Employee	151 (45.8)	179 (54.2)	330 (31.6)	
	Farmer	13 (65)	7(35)	20 (1.6)	
	Housewife	92 (27)	249 (73)	341 (32.7)	
	Freelance	90 (61.6)	56 (38.4)	146 (14)	
	Unemployed	21 (47.7)	23 (52.3)	44 (4.2)	
	Unknown	13 (44.9)	16 (55.1)	29 (2.8)	
Job	Industrial	66 (48.5)	70 (51.5)	136 (13)	0.12
	Non-industrial	377 (41.6)	530 (58.4)	907 (87)	
Smoking	Yes	137 (55.9)	108 (44.1)	798 (76.5)	0.001
	No	306 (38.3)	492 (61.7)	245 (23.5)	
Calcium supplementation	Yes	402 (46.9)	456 (53.1)	858 (82.3)	0.001
	No	41 (22.3)	144 (77.8)	185(17.7)	
Vitamin D supplementation	Yes	428 (44.4)	535 (55.6)	963 (92.3)	0.001
	No	15 (18.7)	65 (81.3)	80 (7.7)	
Blood pressure	Yes	383 (44.9)	470 (55.1)	853 (81.8)	0.001
	No	60 (31.6)	130 (68.4)	190 (18.2)	
Diabetes	Yes	396 (43.3)	519 (56.7)	915 (87.7)	0.16
	No	47 (36.7)	81 (63.3)	128 (12.3)	

functional disability, difficulty in performing certain tasks, and extra-articular symptoms of rheumatic diseases.[5] Demographic information and behavioral and contextual data were collected for all participants.

Statistical Analysis

Statistical analysis was performed by SPSS version 21.0. The difference was considered statistically significant at $P<0.05$. To analyze and measure the relationship between variables, chi-square test, independent *t* test, and one-way analysis of variance were used. Then, the variables with $P<0.2$ in the univariate tests were entered into the logistic regression model, and backward elimination was used to determine the final model.

Results

Most of the participants were female (50.5%), in the age category of 35-50 years (52.9%), married (95.7%), and of Fars ethnicity (48.1%). Based on the results, the prevalence of RD in the study population was 57.5% (95% CI, 53-62%) (600 people). The frequency of RD was higher in females ($P<0.001$), age group of 35 to 50 years ($P=0.001$), and city dwellers ($P=0.004$). The frequency of smoking was lower in people with RD ($P<0.001$) (Table 1).

Modeling Factors Related to Rheumatic Disorder

The findings show that the risk of RD increases with increasing age ($P<0.001$). Females are 2.8 times more prone to RD than males ($P<0.001$). Villagers are less likely to suffer from RD than urban residents ($P<0.001$). Moreover, with an increase in body mass index, the chance of developing RD increases ($P<0.001$), and people who took calcium and vitamin D supplements have a higher chance of developing RD ($P<0.02$) (Table 2).

Table 2. Factors Related to Rheumatic Disorders in Shahrekord Cohort Study

Variable	Total OR (95% CI) *P* Value	Male OR (95% CI) *P* Value	Female OR (95% CI) *P* Value
Age	1.03 (1.05-1.09) 0.0001	1.03 (1.01-1.05) 0.001	1.04 (1.02-1.07) 0.001
Gender			
Male (reference)			
Female	2.83(2.12-3.76) 0.0001	-	-
Residence			
Urban (reference)			
Rural	0.45 (0.31-0.66) 0.001	0.36 (0.19-0.69) 0.002	0.49 (0.30-0.70) 0.003
BMI	1.03 (1.02-1.09) 0.001	1.06 (1.01-1.10) 0.01	1.06 (1.01-1.10) 0.01
Calcium supplementation	1.93 (1.29-2.90) 0.001	2.55 (1.23-5.30) 0.01	1.72 (1.05-2.82) 0.03
Vitamin D supplementation	2.12 (1.15-3.93) 0.02	-	2.22 (1.01-4.96) 0.05
Job			
Non-industrial (reference)			-
Industrial	-	1.53 (0.95-2.45) 0.07	

Discussion

Based on the results of the present study, the prevalence of RD was 57.5%, according to the COPCORD questionnaire. It was reported to be 42.8% in the study conducted by Moghimi et al [5]. The prevalence was higher in our study. In the study conducted by Gremese in the United States, the prevalence of RD was reported to be 15 to 20%.[6] The variations in the prevalence of RD in different studies and regions can be attributed to genetic, geographical, and cultural differences, as well as social, cultural, and economic conditions of different populations.[7] These variations are also indicative of differences in the epidemiological conditions of each region.[8] Cold weather was also associated with an increase in the risk of RD. Ch & B province has a cold climate; therefore, one of the possible reasons for the higher prevalence in this study compared to other studies could be the climate and weather conditions.[9,10]

In this study, the average age of people with RD was higher compared to people without RD. In the United States, it has also been shown that the prevalence of RD increases with age. In general, RD is mainly caused by gradual and progressive loss of articular cartilage with deformation of the subcutaneous bone, a process that increases with age.[11]

The prevalence of RD was higher in city dwellers, employed people, and illiterate people with higher body mass index. RD are complex disorders that can be identified by one or more related factors that include gender, age, weight, height, body mass index, and obesity. Obesity is indeed expected to be a consequence of some rheumatic diseases, either as part of metabolic syndrome or reduced mobility due to musculoskeletal manifestations.[12,13] In this study, urbanization was considered one of the factors related to RD. This finding may be related to the villagers' lack of access to health and diagnostic services. Industrial work was found to be one of the factors related to the disease in males. Besides, the excessive and unusual pressure on the joints, environmental factors, standing for a long time, and injury to the joints, especially the knees and wrists, were causes of these disorders in workers.[14]

Limitations

- This is an analytical cross-sectional study and it is not possible to make a causal inference. Therefore, RD causes an increase in the consumption of vitamin D and calcium, but vitamin D intake and calcium consumption are not risk factors for RD.
- Considering that the cohort study was conducted on the population in the age group of 35 to 70 years, it was not possible to examine people at older ages, who might have a higher prevalence of RD. Therefore, our results show the prevalence of RD only in the age group of 35 to 70 years.
- The tool we used to collect information in this study

is a screening tool for RD; therefore, those who are considered positive in this tool need further investigations for a definitive diagnosis. Therefore, there is a possibility that the prevalence in this study is overestimated.

Conclusion

The prevalence of RD in this study was high. The female gender, old age, and obesity were among the factors related to RD in this study. As a result, public education is necessary to modify the behavioral pattern and lifestyle.

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Authors' Contribution

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Competing Interests

The authors declare that there is no conflict of interests.

Ethical Approval

Ethical considerations in this study included obtaining permission from the Ethics Committee of Shahrekord University of Medical Sciences (IR.SKUMS.REC.1400.101) and obtaining written consent to participate in the study from the participants.

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